NOTOR 65

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:
Fagerhults Belysning AB, Åvägen 1, 566 80 Habo, Sweden

Programme:	*The International EPD® System, www.environdec.com*
Programme operator:	EPD International AB
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

FAGERHULT

EPD®

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): *pcr2019-14 Construction products v1.11 and UN CPC code(s)>* Together with EN 15804:2012+A2:2019
PCR review was conducted by: *The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Martyna Mikusinska, Sweco Environment AB, Martyna.Mikusinska@sweco.se, +46 (0)19-168178 Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

The LCA approach harmonizes with the Product Environmental Footprint Category Rules for building products in cradle to grave perspective (EN 15804) (Environdec, 2020). The Life Cycle Assessment report (Wendin, 2021) is available to EPD-auditor on request and include all the detailed information required according to ISO 14044.

Company information

Owner of the EPD:
Fagerhults Belysning AB

Contact:
Niclas Thulin

Description:
Fagerhult develops, produces and markets professional lighting solutions for public environments such as offices, schools, retail areas, industries and hospitals, indoor and outdoor. Our lighting knowledge, in combination with a wide range of innovative, energy efficient, less environmental impact lighting solutions, makes us a natural partner for the entire project. Fagerhult is a part of the Fagerhult Group, one of Europe's leading lighting companies with 4,400 employees in 28 countries around the world.

Product-related or management system-related certifications:
Fagerhults Belysning AB are ISO 9001 and ISO 14001 certified. All products are produced in accordance with the requirements for CE-marking and are tested in accordance with industry standards. EN 15193 (Office light).

Name and location of production site(s):
Fagerhults Belysning AB, Habo, Åvägen 1, 566 80 Habo

Product information

Product family:
Notor 65

Product identification:
Notor 65 Beta Opti, Notor 65 Delta, Notor 65 Opal, Notor 65 Indirect.
Only standard length 1200 mm, see specific article numbers in Appendix 1.

Product description:
The Notor 65 is an office luminaire that enables everything from general lighting to functional work lighting for offices and monitor work. The luminaire is available with Beta Opti, Delta or Opal louvre and with different light distributions; direct, direct/indirect or indirect light. The quick connectors facilitate an easy installation and makes it simple to create long, unbroken lines of light.

UN CPC code:
412 Products of iron or steel (no more relevant found).

Other codes for product classification:
IFC: Light Fixture
ETIM: EG000027 | Luminaries
HS Code: 94051098 – Electric, ceiling, wall

LCA information

Declared Unit	One Notor 65 which represent a family of articles with small variations, represented by worst case. The product weight is 4,3 kg (at most and minimum 2,1 kg) (Fagerhult, 2021).
The functional unit	2500h Office light.
The functional	The function is office light in 2500h operation per year according to EN 15193. During the lifetime (RSL) that implies 1 product consuming 1700 kWh electricity. Effect: 34-watt average of the product family (Office is 40 watt).
Reference Service Life (RSL)	The RSL is set to 20 years. The RSL is based on the experience from customer relations.
Technical lifetime	100 000 operation hours. (40 years).
Product group classification	UN CPC
Goal	The result will be used to understand the environmental impact of the product during the life cycle. This will be useful during product development to reduce this impact and to our customer during the decision process of selecting luminaires. The result will be published by the International EPD system. The audience are lighting installers, lighting designers, architects, constructors.
Scope	Cradle to gate with options, modules C1–C4, and module D.
Time	Data represent the year 2019
Manufacturing Site	Fagerhults Belysning, Habo, Sweden.
Geographical Area	Europe. Use and disposal is represented by Sweden. The difference in results is described in additional information at page 12.
Compliant with	This EPD follows the “Book-keeping“ LCA approach which is defined as an attributional LCA in the ISO 14040 standard. ISO 14025 EN 15804:2012+A2:2019 Product Category Rules PCR 2019-12-20. Construction products and construction services Version 2.33.
Cut-Off Rules	The procedure below is followed for the exclusion of inputs and outputs according to the EN 15804:2012+ A2:2019 standard: No cut-offs have been made concerning specific data in this study.
Background Data	The background data from ecoinvent 3.6 are from 2016-2019.
Electricity data	Electricity consumption in the A3 module is Goo-certified hydro power and B6 Electricity is represented by data for national production mix in Ecoinvent 3.6 regionalized for Sweden.
LCA software	SimaPro 9.1.1.1

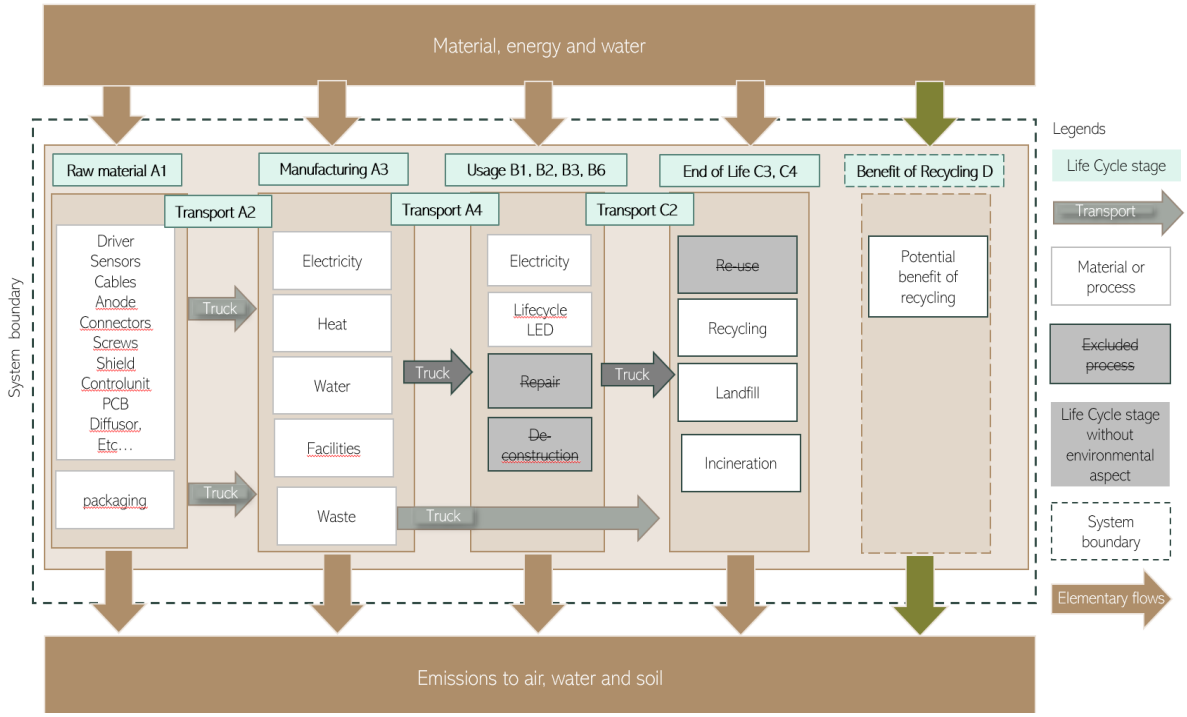
Assumptions in modules after A3:

The distribution to clients is represented by an estimated average sized truck (32-ton payload) with average level of filling (75%), and an estimated average distance to client of 400 km.

The product is most often used in the application “offices” with a yearly operating of 2500 hours. It is normally used for 20 years.

Deconstruction is not required only sorting as electronic waste. The electronic waste is transported to municipal treatment of electronic waste. The waste is sorted manually. The materials final disposal are different waste treatment to material recycling.

System diagram:



More information:
This study goes from cradle-to-grave. That means that all processes needed for raw material extraction, manufacturing, transport, usage and end-of-life are included in the study.

Included	**Excluded**
Production of the components and packaging (A1)	Production of machines.
Transport to manufacturing (A2)	Transport of returned products.
Electricity, water, heat and waste for manufacturing (A3)	Labour and related aspects.
Production of materials for facilities and land use (A4)	Retail not relevant.
Transport of products to client and to disposal (A4 & C2)	Business travel.
Electricity consumption (user) (B6)	Research and development activities.
Replacement of LED (B4)	
Disposal, dismantling and treatment of waste (C3 & C4)	
Avoided production of raw materials if recycled according to average municipal recycling in Sweden (D)	

Modules declared (X included, ND not declared), geographical scope, share of specific data (in GWP-GHG indicator) and data variation: EPD modules included (G = generic data, S = Specific data).

	Raw material		Manufacturing			Use							End of life				Reuse
	Raw material	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Renovation	Energy during use	Water use	Demolition	Transport	Waste process	Final disposal	Potential benefit in recycling
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	X	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X	X[1]	X[1]	X	X[1]	X	X
Geography	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Variation – products (% of GWP[2])	-4,5	0	0	-0,05	0	-	-	-	-	-	-	-	-	-	-	-	
Type of data	G	G	S	G	-	-	-	-	-	-	G	-	-	G	-	S	

The product's variations of constituent components (Delta sheet, number of LED cards, Louvre, Profile) gives a variation on environmental impact that is -4,5% (less than 10%). The maximum environmental impact is reported as a result. The difference in weight of the product is significantly greater. The reason why it does not affect the result more is that the material that reduces the weight, has been cut out of a plate, and therefore the amount consumed is the same. The variation in climate impact has been analyzed with Monte Carlo simulation.

Data quality indicators (DQI):

Time period: 2014 and after
Geography: Europe, Western
Technology: Average technology or BAT[3]
Representativeness: Average from a specific process
Multiple output allocation: Physical causality
Substitution allocation: Not applicable
Waste treatment allocation: Not applicable
Cut-off rules: Less than 1% environmental relevance
System boundary: Second order (material/energy flows including operations)
The boundary with nature: Not applicable

[1] Included but does not have any environmental aspects.
[2] Variation of the product which exclude the components is represented by the GWP.
[3] BAT (Best Available Technology or Best Available Techniques) signifies the latest stage in development of activities, processes and their method of operation which indicate the practical suitability of particular techniques as the basis of emission limit values, linked to environmental regulations, such as the European Industrial Emissions Directive (IED, 2010/75/EU) . In determining whether operational methods are BAT, consideration is given to economic feasibility and the availability of techniques to carry out the required function. The BAT concept is closely related to BEP (Best Environmental Practice), which is the best environment-friendly company practice.

Content information

The product weight is 4,3 kg (as worst case, and minimum 2,1 kg) (Fagerhult, 2021). The variation of functionality means that some components are not used. Several other variations are possible.

Material	Material Specification	Weight (kg)	Share weight-%
Aluminium	EN AW 6060	1,84	43%
Plastic	PMMA	0,58	13%
Steel	DC01	0,44	10%
Steel	EN 10 142	0,35	8%
Aluminium	Miro 5	0,23	5%
Driver	Electronics	0,21	5%
Wire		0,14	3%
LED-Module		0,11	3%
Aluminium	EN AW 5052	0,07	2%
Plastic[4]	LDPE	0,06	1%
Plastic	PC	0,06	1%
Aluminium	EN AB 46200	0,06	1%
Plastic[4]	EPS	0,05	1%
Sensor	Electronics	0,04	1%
Other Steel		0,04	1%
Plastic	PET	0,01	0%
Other		0,01	0%
Plastic	PA	0,00	0%
SVHC[5]		0,00	0%

Packaging materials	Weight (kg)	Weight-% (versus the product)	Biobased (%)
Plastic	0,114	3% (5%)	0
Paper	0,01	0,2	0,2
Wood (pallet)	0,24	6% (11%)	6% (11%)
Product weight	4,3 (2,1)		

[4] Plastic in packaging

[5] SVHC and the Candidate List of SVHC are available via the European Chemicals Agency . No substances on the SVHC is included (Ström, 2020) Candidate List of substances of very high concern for Authorisation - ECHA (europa.eu)

Environmental Information

The results represent the worst case, including all possible components. The results with the variation with the least materials has 4,5% lower “climate impact”.

Potential environmental impact – mandatory indicators according to EN 15804

Impact category	*Unit*	*A1*	*A2*	*A3*	*A4*	*B1*	*B2*	*B3*	*B4*	*B5*	*B6*	*B7*	*C1*	*C2*	*C3*	*C4*	*D*
Climate change - Fossil	kg CO2 eq	57	1,2	4	0,15	0	0	0	0	0	86	0	0	0,35	0	4,58	-46
Climate change - Biogenic	kg CO2 eq	0	0	0	0	0	0	0	0	0	1,5	0	0	4,0 E-05	0	2,3E-04	-1,1E-01
Climate change - Land use and LU change	kg CO2 eq	0	0	0	4,6E-05	0	0	0	0	0	6	0	0	2,9 E-05	0	1,3E-04	-3,0E-01
Climate change	kg CO2 eq	58	1,2	5	0,15	0	0	0	0	0	93	0	0	0,35	0	4,9E+00	-46,4
Ozone depletion	kg CFC11 eq	0	0,5	0	0	0	0	0	0	0	0	0	0	7,4 E-08	0	3,2E-08	-3,4E-06
Acidification	mol H+ eq	0	2,5	0	4,8E-04	0	0	0	0	0	1	0	0	2,1 E-03	0	2,2E-03	-2,2E-01
Eutrophication, freshwater	kg PO4	0	3,3	0	3,4E-05	0	0	0	0	0	0	0	0	0	0	6,1E-04	-0,030
Eutrophication, freshwater	kg P eq	0	1,1	0	1,1E-05	0	0	0	0	0	0	0	0	6,1 E-06	0	2,0E-04	-0,010
Eutrophication, marine	kg N eq	0	2,4	0	1,1E-04	0	0	0	0	0	0	0	0	9,0 E-04	0	1,6E-03	-3,6E-02
Eutrophication, terrestrial	mol N eq	1	2,9	0	1,2E-03	0	0	0	0	0	1,3	0	0	0,01	0	0,01	-3,7E-01
Water use	m3 depriv.	16	1,9	3	7,9E-03	0	0	0	0	0	127	0	0	2,0 E-03	0	0,35	-6,82
Photochemical ozone formation	kg NMVOC eq	0	3,5	0	4,6E-04	0	0	0	0	0	0	0	0	3,5 E-03	0	2,5E-03	-1,3E-01
Resource use, minerals and metals	kg Sb eq	9,7 E-03	5,3 E-07	3,7 E-04	2,7E-06	0	0	0	0	0	3,4E-03	0	0	2,1 E-06	0	2,4E-06	-2,1E-04
Resource use, fossils	MJ	755	1,7	59	2,43	0	0	0	0	0	10113	0	0	4,60	0	2,52	-465

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Potential environmental impact – additional mandatory and voluntary indicators

Impact category	Unit	A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP GHG	kg CO2 eq	56	1	5	0	0	0	0	0	0	91	0	0	0	0	2	-46

Due to differences in the method EF and IPCC, both results may be important to display.
The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources

The consumption of resources in terms of energy is measured as primary energy demand with the method CED 1.11.

		Raw material		Manufacturing		Use							End of life				Reuse
Parameter	**Unit**	**A1**	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	231	0,0	63	0,0	0	0	0	0	0	4848	0	0	0,0	0	0,2	-95,9
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	231	0	63	0,0	0	0	0	0	0	4848	0	0	0,0	0	0,2	0,0
PENRE	MJ	808	1,8	63	2,6	0	0	0	0	0	10164	0	0	4,7	0	7,6	-494,6
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	808	1,8	63	2,6	0	0	0	0	0	10164	0	0	4,7	0	7,6	0,0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m3	16	0,005	1,9	0,008	0	0	0	0	0	117	0	0	0,015	0	0,4	0,0

Legend	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	Use of renewable primary energy resources used as raw materials
PERT	Total use of renewable primary energy resources
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	Use of non-renewable primary energy resources used as raw materials
PENRT	Total use of non-renewable primary energy resources
SM	Use of secondary material
RSF	Use of renewable secondary fuel
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water

Information on biogenic carbon content

Results per functional or declared unit		
Biogenic Carbon Footprint	**Unit**	**Quantity**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0,44

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

Waste production and output flows

The production of waste in terms of final waste and the output of materials for recycling, is measured from the calculation of selected inventory results with our own method[6]. Final waste and output flows, refers to flows that are leaving the system of the LCA. In this LCA only elementary flows (substances) are leaving the system. For the manufacturing at Fagerhult, there are no such flows.

Waste production:

		Raw material		**Manufacturing**		**Use**							**End of life**				**Reuse**
Parameter	Unit	A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWD	Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Legend																	
HWD	Hazardous waste disposed																
NHWD	Non-hazardous waste disposed																
RWD	Radioactive waste disposed																

Output flows:

		Raw material		**Manufacturing**		**Use**							**End of life**				**Reuse**
Parameter	**Unit**	**A1**	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
CRU	Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,29	0
MER	Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,24	0
EE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Legend																	
CRU	Component for reuse *																
MFR	Material For Recycling																
MER	Material for energy recovery																
EE	Exported energy																

[6] EPD (2018) EN15804 v3

Additional information

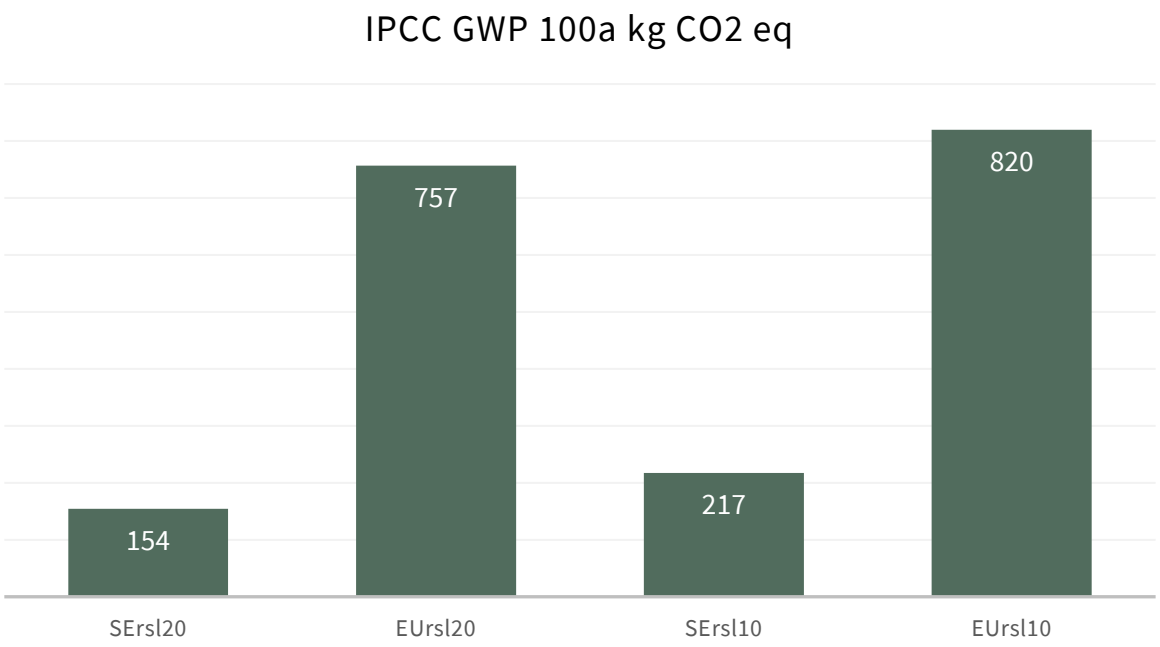
The environmental impact of Notor 65 in a lifecycle perspective, comes mostly from the electricity consumption in the use phase and from the production of raw materials.

The environmental impact of the electricity is dominated by the environmental effect category “Resource use, fossils”. The source is electricity from the grid in Sweden, which has relatively low impact in comparison to electricity in other countries.
The environmental impact of the raw materials is dominated by the environmental effect category “Resource use, minerals and metals”.

The components that contribute the most are the LED card (FLLS), the sensor E, the driver and the anode sensor.

The model of the product system and value chain is sensitive to the source of energy in production of the electricity. If the product is used instead with European electricity, the climate impact (GWP) is 391% higher.

If the product has a shorter lifetime (rsl), the climate impact (GWP) is 41% higher.



Sensitivity of GWP when changing electricity from Sweden (SE) to European (EU), and changing lifetime (rsl) from 20 to 10 years, in the same period of comparison (20 years).

The product Notor 65 has many variations. It is represented by the most conservative option (that gives the highest environmental impact). In that way the result is easier to communicate because it is avoided having different results for all the variations. The single largest difference would be the exclusion of the component “Delta sheet 1200” which contribute with 3% of the GWP of Notor 65 (cradle to gate).”

References

General Programme Instructions of the International EPD® System. Version 3.01.

Environdec. (2020). Construction products. In *PCR 2019:14, VERSION 1.1*. https://doi.org/10.4324/9780203476154_chapter_5

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Appendix 1

Following products are included in the EPD.

13300-13315, 13332-13347, 13372-13387, 13412-13427, 13453, 13455, 13457, 13459, 13477, 13479, 13481, 13483, 13500-13503, 13508-13511, 13521, 13523, 13533, 13535 (including suffixes -402, -449, -533, -539, -554, -546).